

intake manifold includes an air diffuser positioned downstream of the throttle valve in the main bore to reduce noise created by air flowing past the throttle valve.

23. An air intake system for a fuel injected internal combustion engine including a throttle body having a throttle valve for controlling airflow through a main bore in fluid communication with an air intake manifold wherein at least one of the throttle body and the air intake manifolds includes an air diffuser positioned downstream of the throttle valve in the main bore to reduce noise created by air flowing past the throttle valve, wherein the air diffuser comprises at least one vane spanning the main bore.

24. An air intake system for a fuel injected internal combustion engine including a throttle body having a throttle valve for controlling airflow through a main bore in fluid communication with an air intake manifold wherein at least one of the throttle body and the air intake manifolds includes an air diffuser positioned downstream of the throttle valve in the main bore to reduce noise created by air flowing past the throttle valve, wherein the air diffuser comprises at least one vane spanning the main bore, wherein at least one vane comprises a plurality of parallel vanes spanning the main bore.

25. An air intake system for a fuel injected internal combustion engine including a throttle body, an air intake manifold, and an air diffuser arranged in the intake system downstream of the throttle body and upstream of a plurality of fuel injectors for reducing noise emanating from the intake system, the air diffuser having a main bore defined by a bore wall and a set of vanes substantially equally spaced from one another and extending from a portion of the bore wall into the main bore.

26. An air intake system for a fuel injected internal combustion engine including a throttle body, an air intake manifold, and an air diffuser arranged in the intake manifold downstream of the throttle body and upstream of a plurality of fuel injectors for reducing noise emanating from the intake system, the air diffuser having a main bore defined by a bore wall and a plurality of radial vanes extending from at least a portion of the bore wall into the main bore.

27. An air intake system for a fuel injected internal combustion engine including a throttle body, an air intake manifold, and an air diffuser arranged in the intake system to reduce

noise emanating from the intake system due to air flowing through the throttle body, the air diffuser having a main bore defined by a bore wall and a first set of vanes spaced from one another and extending parallel to one another from a portion of the bore wall into the main bore, and a second set of vanes spaced from one another and extending parallel to one another from a different portion of the bore wall than the first set into the main bore.

28. The air intake system of claim 27 wherein the air diffuser comprises a separable component mounted between the throttle body and the air intake manifold.

Cl 29. The air intake system of claim 27 wherein the air diffuser comprises a plate having an upstream face and a downstream face with the vanes extending beyond the face of at least one of the upstream and downstream faces.

30. An air intake system for a fuel injected internal combustion engine including a throttle body having a first bore wall defining a first portion of a main bore and a throttle valve for controlling airflow through the main bore, an air intake manifold in fluid communication with the throttle body and including a second bore wall defining a second portion of the main bore, the air intake system comprising an air diffuser disposed downstream of the throttle valve and having at least one vane extending across the main bore connecting to two locations of the bore wall to reduce noise associated with air flowing past the throttle valve.

31. An air intake system for a fuel injected internal combustion engine including a throttle body having a first bore wall defining a first portion of a main bore and a throttle valve for controlling airflow through the main bore, an air intake manifold in fluid communication with the throttle body and including a second bore wall defining a second portion of the main bore, the air intake system comprising a diffuser having a grid pattern for diffusing and redirecting air flowing through the main bore to reduce noise emanating through the intake system associated with air flowing past the throttle valve.

32. An air intake system for a fuel injected internal combustion engine including a throttle body having a first bore wall defining a first portion of a main bore and a throttle valve for controlling airflow through the main bore, an air intake manifold in fluid communication with the throttle body and including a second bore wall defining a second portion of the main

bore, the air intake system having means for diffusing and redirecting air flowing through the main bore to reduce noise associated with air flowing past the throttle valve.

33. An air intake system for controlling the flow of air into an internal combustion engine comprising:

a throttle body including a first bore wall defining a first portion of a main bore and a valve mounted within the first portion of the main bore with the valve being movable to selectively restrict flow of air through the main bore;

an intake manifold including a second bore wall defining a second portion of the main bore, with the second bore wall having an upstream end, and the manifold further including means for mounting the throttle body relative to the intake manifold such that the first and the second portions of the main bore align with one another, with the intake manifold being downstream of the throttle body, and with the manifold including an EGR inlet adjacent the upstream end of the second bore wall; and

a plurality of vanes spaced from one another disposed downstream of the valve and extending into the main bore to reduce sound generated within the intake system associated with air flowing past the valve.

34. The air intake system of claim 33 wherein the plurality of vanes extends from the first bore wall.

35. The air intake system of claim 33 wherein the plurality of vanes extends from the second bore wall.

36. The air intake system of claim 33 further comprising an air diffuser positioned between the throttle body and the intake manifold, the air diffuser having a third bore wall defining a third portion of the main bore wherein the plurality of vanes extends from the third bore wall into the third portion of the main bore.

37. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow therethrough, an intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

redirecting air flowing past the intake throttle using a plurality of vanes extending into the airflow downstream of the throttle valve to reduce noise associated with the air flowing past the throttle valve.

38. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow therethrough, an intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

redirecting air flowing past the intake throttle using a plurality of substantially evenly spaced parallel vanes extending into the airflow downstream of the throttle valve and upstream of the intake manifold to reduce noise associated with the air flowing past the throttle valve.

39. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow through an intake passage, an intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

redirecting air flowing past the throttle valve using a diffusing element spanning the intake passage downstream of the throttle valve and upstream of the intake manifold to reduce noise associated with the air flowing past the throttle valve.

40. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow through an intake passage, an intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

redirecting air flowing past the throttle valve using a plurality of diffusing elements arranged in a grid pattern spanning the intake passage downstream of the throttle valve and upstream of the intake manifold to reduce noise associated with the air flowing past the throttle valve.

41. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow through an intake passage, an intake

manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

modifying airflow past the throttle valve using a diffusing element having a grid pattern and extending across the intake passage downstream of the throttle valve and upstream of the fuel injectors to reduce noise associated with the air flowing past the throttle valve.

42. An air diffuser for use with an air intake system of a fuel injected internal combustion engine having a throttle body and an air intake manifold, the air diffuser comprising:

a body defining an air passage and adapted for mounting between the throttle body and the intake manifold; and

a plurality of vanes extending from the body into the air passage to redirect air flowing through the passage and reduce associated noise.

43 42. An air diffuser for use with an air intake system of a fuel injected internal combustion engine having a throttle body and an air intake manifold, the air diffuser comprising:

a body defining an air passage and adapted for mounting between the throttle body and the intake manifold; and

a plurality of vanes extending from the body into the air passage to redirect air flowing through the passage and reduce associated noise.

44 43. An air diffuser for use with an air intake system of a fuel injected internal combustion engine having a throttle body and an air intake manifold, the air diffuser comprising:

a body defining an air passage and adapted for mounting between the throttle body and the intake manifold; and

a plurality of vanes spaced from one another and extending from the body into the air passage to redirect air flowing through the passage and reduce associated noise.

45 44. The air diffuser of claim <sup>44</sup>43 wherein the plurality of vanes spans the air passage.

46 45. The air diffuser of claim <sup>45</sup>44 wherein the plurality of vanes are substantially parallel.

47 46. The air diffuser of claim <sup>45</sup>45 wherein the plurality of vanes forms a grid pattern.

*48* ~~47~~. The air diffuser of claim <sup>44</sup>~~43~~ wherein at least some of the plurality of vanes extend inward from the body toward a center of the air passage.

*49* ~~48~~. The air diffuser of claim <sup>44</sup>~~43~~ wherein the body defines a substantially circular air passage.

*50* ~~49~~. The air diffuser of claim <sup>44</sup>~~43~~ wherein at least some of the plurality of vanes taper as they extend into the air passage.

*51* ~~50~~. An air diffuser for use with an air intake system of an internal combustion engine including a throttle body and an air intake manifold, the air diffuser comprising:

a body adapted for mounting between the throttle body and the air intake manifold, the body having a main passage for accommodating airflow from the throttle body to the air intake manifold;

a first set of vanes spaced from one another and extending from a first portion of the body into the main passage;

a second set of vanes spaced from one another and extending from a second portion of the body into the main passage, wherein an average length of the first set of vanes is less than an average length of the second set of vanes.

*52* ~~51~~. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the air intake system comprising an intake manifold having a wall defining a main air passage for receiving airflow, the wall including a diffusing element within the main air passage upstream of the plurality of fuel injectors for reducing noise emanating from the intake system associated with airflow through the intake system.

*53* ~~52~~. An air intake system for controlling the flow of air into an internal combustion engine, the air intake system comprising an intake manifold having a wall defining a main air passage for receiving airflow, the wall including a plurality of parallel vanes extending into the main bore for reducing noise emanating from the intake system associated with airflow through the intake system.

54 ~~53~~. An air intake system for controlling the flow of air into an internal combustion engine including an EGR circuit for selectively diverting a portion of exhaust gas to the intake system via an EGR inlet, the air intake system comprising an intake manifold having a wall defining a main air passage for receiving airflow, the wall including an integral air diffuser extending into the main bore upstream of the EGR inlet for reducing noise emanating from the intake system associated with airflow through the intake system and reducing upstream flow of EGR gases.

55 ~~54~~. A method for use in a fuel injected internal combustion engine having a throttle body with a throttle valve for selectively restricting airflow therethrough, an intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

modifying airflow through the intake using a plurality of vanes extending into the airflow downstream of the throttle valve to reduce noise associated with the air flowing past the throttle valve.

56 ~~55~~. A method for use in a fuel injected internal combustion engine having a plastic throttle body with a throttle valve for selectively restricting airflow therethrough, a plastic intake manifold, and a plurality of fuel injectors for injecting fuel into the air downstream of the throttle valve, the method comprising:

modifying airflow through the plastic throttle body using a plurality of substantially evenly spaced parallel vanes integrally formed in the throttle body and extending into the airflow downstream of the throttle valve and upstream of the intake manifold to reduce noise associated with the air flowing past the throttle valve.

57 ~~56~~. An air intake system for controlling the flow of air into a fuel injected internal combustion engine, the system comprising:

a plastic throttle body including a first wall defining a first portion of a main air passage and a valve mounted within the first portion of the main air passage with the valve being movable to selectively restrict flow of air through the main air passage, the plastic throttle body

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having an integrally formed air diffuser disposed downstream of the valve to reduce sound generated within the intake system associated with air flowing past the valve.

*58 57* An air intake system for controlling the flow of air into a fuel injected internal combustion engine, the system comprising:

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a plastic throttle body including a first wall defining a first portion of a main air passage and a valve mounted within the first portion of the main air passage with the valve being movable to selectively restrict flow of air through the main air passage, the plastic throttle body having an integrally formed air diffuser disposed downstream of the valve to reduce sound generated within the intake system associated with air flowing past the valve; and

a plastic intake manifold including a second wall defining a second portion of the main air passage, with the second wall having an upstream end, and the manifold further including means for mounting the plastic throttle body relative to the plastic intake manifold such that the first and the second portions of the main air passage align with one another, with the plastic intake manifold being downstream of the plastic throttle body, and with the manifold including an EGR inlet adjacent the upstream end of the second wall.

*59 58* An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

a plastic throttle body including a first wall defining a first portion of a main air passage and a valve mounted within the first portion of the main air passage with the valve being movable to selectively restrict flow of air through the main air passage; and

a plastic intake manifold including a second wall defining a second portion of the main air passage, with the second wall having an upstream end, and the manifold further including means for mounting the plastic throttle body relative to the plastic intake manifold such that the first and the second portions of the main air passage align with one another, with the plastic intake manifold being downstream of the plastic throttle body, and with the manifold including an EGR inlet adjacent the upstream end of the second wall, the plastic intake manifold having an integrally formed air diffuser disposed downstream of the valve and upstream of the fuel



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injectors to reduce sound generated within the intake system and to reduce upstream flow of EGR gasses past the throttle valve.

60 59. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a throttle valve disposed upstream of a plurality of fuel injectors, the system comprising:

a plastic intake manifold including a wall defining a main air passage, with the wall having an upstream end, the manifold further including an integrally formed air diffuser disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system associated with air flowing past the throttle valve.

C 1 61 60. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having an intake manifold for receiving and distributing intake air to a plurality of cylinders comprising a plastic throttle body including a main air passage having a plurality of integrally formed plastic vanes extending into the main air passage for reducing noise associated with airflow therethrough.

62 61. An air intake system for controlling the flow of air into a fuel injected internal combustion engine comprising a plastic throttle body including a main air passage having a plurality of substantially equally spaced parallel vanes extending into the main air passage, the vanes being integrally formed with the plastic throttle body.

63 62. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

a plastic throttle body having a main air passage and a throttle valve mounted within the main air passage with the throttle valve being movable to selectively restrict flow of air through the main air passage, the plastic throttle body having an integrally formed air diffuser disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system.

64 63. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

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a plastic throttle body having a main air passage and a throttle valve mounted within the main air passage with the throttle valve being movable to selectively restrict flow of air through the main air passage, the plastic throttle body having an integrally formed air diffuser having a grid pattern disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system.

65 64. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

a plastic throttle body having a main air passage and a throttle valve mounted within the main air passage with the throttle valve being movable to selectively restrict flow of air through the main air passage; and

C an air diffuser disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system.

66 65. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

a plastic throttle body having a main air passage and a throttle valve mounted within the main air passage with the throttle valve being movable to selectively restrict flow of air through the main air passage; and

an air diffuser having a grid pattern disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system.

67 66. An air intake system for controlling the flow of air into a fuel injected internal combustion engine having a plurality of fuel injectors, the system comprising:

a plastic throttle body having a main air passage and a throttle valve mounted within the main air passage with the throttle valve being movable to selectively restrict flow of air through the main air passage; and

a plastic air diffuser disposed downstream of the throttle valve and upstream of the fuel injectors to reduce sound generated within the intake system.

68 67. An system for controlling flow into an internal combustion engine, comprising:

a throttle body having a throttle valve for controlling airflow through a main bore;

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an air intake manifold coupled to said throttle body, at least one of the throttle body and the air intake manifold including an air diffuser positioned downstream of the throttle valve in the main bore to reduce noise created by air flowing past the throttle valve; and

fuel injectors located downstream of the throttle body.

*69* ~~68~~. The system recited in Claim ~~67~~<sup>68</sup> wherein said fuel injectors are mounted to the intake manifold.

*76* ~~69~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the engine has a cylinder head, and said fuel injectors are mounted to said cylinder head.

*71* ~~70~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the intake manifold is plastic.

*72* ~~71~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the throttle body is plastic.

*73* ~~72~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the air diffuser is plastic.

*74* ~~73~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the air diffuser comprises a first set of parallel vanes and a second set of parallel vanes forming a grid pattern.

*75* ~~74~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the air diffuser comprises at least one vane extending into the main bore.

*76* ~~75~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the air diffuser comprises at least one vane spanning the main bore.

*77* ~~76~~. The system recited in Claim ~~67~~<sup>68</sup> wherein the air diffuser comprises at least one vane extending only partially into the main bore.

*78* ~~77~~. The system recited in Claim ~~67~~<sup>68</sup> further comprising an EGR assembly located downstream of said throttle valve.

*79* ~~78~~. The system recited in Claim ~~77~~<sup>78</sup> wherein said air diffuser is plastic.

*80* ~~79~~. The system recited in Claim ~~67~~<sup>68</sup> wherein said engine is a V-type engine.

*81* ~~80~~. The system recited in Claim ~~79~~<sup>80</sup> wherein said engine is a V-6 engine.

*82* ~~81~~. The system recited in Claim ~~67~~<sup>68</sup> wherein said air diffuser is integrally formed in said manifold.

*83* ~~82~~. The system recited in Claim ~~67~~<sup>68</sup> wherein said air diffuser is integrally formed in said throttle body.

Amendment

Reissue Appln. 09/909,430 (USP 5,924,398)

*Kelly 1/12/06*  
*C1*  
~~84~~ <sup>68</sup> 83. The system recited in Claim ~~67~~ wherein said air diffuser is plastic and said throttle body is plastic.

~~85~~ <sup>68</sup> 84. The system recited in Claim ~~67~~ further comprising an EGR assembly located downstream of said throttle valve.

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